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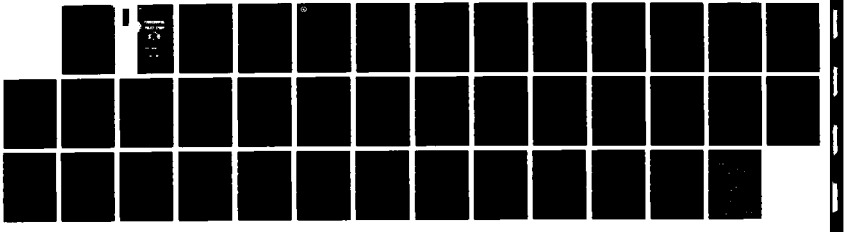

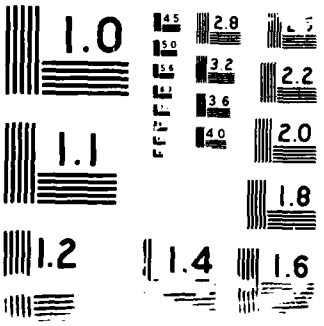
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This project examined a number of alternative policies for buying and supporting provisioning items. Actual (historical) data was used in conjunction with a model of the inventory and provisioning systems. A statistical comparison of outcome measures, such as the total dollar of commitments and the number of backorders generated, was used to assess the alternative provisioning policies. The results of the study identified several policies which significantly reduced the dollar value of inventory, and others which significantly reduced the number of backorders. In general, the provisioning policies evaluated demonstrated an inverse relationship between commitments and assets on the one hand and backorders on the other hand. Two particular policies were identified which slightly increased the dollar value of commitments and assets, but significantly reduced the number and dollar value of backorders.

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DLA-LO

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FOREWORD

This report presents the findings of the study of provisioning policy alternatives conducted by the Operations Research and Economic Analysis Office at Defense Logistics Agency (DLA). The study compared a number of different policies for handling the provisioning information provided to DLA by the Services. A model of the provisioning and inventory processes was developed and used to test two samples of items. One sample consisted of new and established items and was examined for 11 quarters. The second sample consisted of new items only and was examined for 16 quarters. Inventory performance measures such as the total dollar value of commitments and the number of backorders generated were used to compare the various alternatives to the current provisioning policy.

The results of the study identified several policies which significantly reduced the dollar value of inventory, and others which significantly reduced the number of backorders. Alternatives which produced moderate decreases in both of these factors were also identified. Recommendations for policy implementation are included in the report.

ROGER C. ROY
Assistant Director
Policy and Plans

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EXECUTIVE SUMMARY

This report documents the findings of the study of provisioning policies conducted by DLA Operations Research and Economic Analysis Office. The purpose of the study was to assess the impacts of alternative provisioning policies on inventory levels.

A total of 21 different policies was examined. The policies involved various combinations of retail and replenishment quantities provided by the Services to DLA in the form of Supply Support Requests (SSRs). Provisioning requirements for both new and established items were considered. Two additional policies, involving the timing and quantity of the initial provisioning buy, were also analyzed.

In order to examine these policies, a model of the inventory system was developed. The model inputs consisted of actual (historical) requisitions, SSRs, leadtimes, dues-in and backorders for two different samples. The first sample consisted of new and established items; 11 quarters of data were available for this sample. The second sample consisted of new items only; 16 quarters of data were examined for these items. The output from the model consisted of various inventory levels and measures of effectiveness including dollar value of buys initiated, dollar value of assets, number of backorders, dollar value of backorders, average length of time on backorder, and number of buys in different dollar value ranges.

A statistical analysis of the model results was undertaken, comparing the different policies with the policy currently used by DLA. The results of the analysis identified two policies which slightly increased the dollar value of commitments and assets, but significantly reduced the number and dollar value of backorders, and the length of time on backorder. The alternative policies relating to the initial provisioning buy resulted in decreases in both commitment dollars and assets, but also produced increases in backorders, backorder dollars, and days on backorder.

The results of the study can best be used in conjunction with an assessment of the purpose of the provisioning policy. The choice between alternatives which reduce inventory dollars and those which reduce backorders should be based on the identification of the relative importance of these factors.

I. INTRODUCTION

A. Background. In March 1985, the DLA Operations Research and Economic Analysis Office (DLA-LO) completed a study comparing provisioning requirements and experienced demand. The results of this study showed large differences between forecasted provisioning requirements and demand. As a result, the Requirements Branch of the Supply Operations Directorate (DLA-OSR) requested a followup study of the provisioning process. The study was to develop a model of the provisioning requirements calculation process which could be used to evaluate alternative provisioning policies.

B. Project Definition

1. Statement of Problem. Previous research has demonstrated the potential for improving the accuracy of forecasted provisioning requirements. The current procedure may result in excess stock for some items and understockage of other items. Alternative policies for handling provisioning requirements might help to eliminate these problems.

2. Purpose of Project. The purpose of this project was to study the impacts of alternative provisioning policies on inventory levels and various measures of effectiveness.

3. Specific Objectives. The specific objectives of this study were:

a. To develop a database of historic Supply Support Requests (SSRs) and requisitions for the items specified in those SSRs.

b. To construct a model of the provisioning requirements process to include calculation of requirements levels and effectiveness measures.

c. To evaluate the impacts of alternative provisioning policies on inventory requirements levels and effectiveness measures.

C. Scope of Project

1. Project Effort

a. The database for the study consisted of all initial and follow-on SSRS for the 15-quarter period from October 1982 through June 1986.

b. SSRs for items managed by the "hardware" Defense Supply Centers (DSCs) only were included in the study. Nonstocked and Numeric Stockage Objective (NSO) items were included in the study.

c. The provisioning model developed included all major requirements calculations performed as part of the Standard Automated Materiel Management System (SAMMS). Returns and disposals were not included in the model.

2. Report Organization

This report is divided into six main sections, including this first introductory section. Section II describes the current provisioning procedures used by DLA and the Services and presents the alternatives examined in the study.

Section III describes the methodology and procedures of the study. Included here is a description of the data used, the selection of the item samples chosen for the study, and a description of the provisioning model developed.

Section IV presents the findings of the data analysis. This includes the presentation of the output of the model runs and the statistical analysis of the measures of effectiveness.

Section V presents a summary of the findings and a discussion of the results. Finally, Section IV presents the conclusions and recommendations resulting from the study.

II. PROVISIONING POLICIES

A. Current Provisioning Policies

The current policy for handling provisioning requirements is mandated for DLA and the Services by DoD Directive 4140.40. When one of the Services determines a requirement for a new item, they project how many of the items they will need and about when the items will be needed. These requirements are then forwarded to DLA in the form of an SSR.

When DLA receives the SSR, the appropriate DSC determines whether or not the required part already has been assigned a National Stock Number (NSN). If so, the requirement is treated as additional to the stock quantities already maintained by DLA, and the SSR is termed a "follow-on" for an established item. If the part required does not already have an NSN assigned to it (and assuming the request meets various technical criteria), an NSN is requested and eventually assigned to the item. The SSR that results in an NSN being assigned is termed the "initial" SSR. Subsequent SSRs are follow-ons.

On the SSR, the Services provide to DLA two quantities: an initial or retail quantity and a replenishment or wholesale quantity. The retail quantity is defined as the quantity of the item required by the Service during the first year of operation of the end item to satisfy initial support requirements. The replenishment quantity represents the total quantity of the item which the Services anticipate will be required to replace parts used in the first year of operation of the end item.

The way in which these quantities are used depends on whether the item is new to DLA or is an established item. If the item is new, the first decision which must be made is whether or not to stock the item. If the replenishment quantity on the SSR is greater than 12, the item becomes a stocked item (Item Category Code (ICC) '1'; Supply Status Code (SSC), '1'). If the replenishment quantity is less than 12, the quantity is compared to those in a "Stocked/Nonstocked Table" maintained by each DSC. The tables provide

thresholds for stocking items based on the Production Leadtime (PLT) and dollar value of annual demand of the item, as estimated by the Service submitting the SSR. If the replenishment quantity is equal to or greater than the appropriate table value, the item is stocked as a Numeric Stockage Objective (NSO) item (ICC='2'). If the quantity is less than the table value, the item is treated as a nonstocked (SSC '3') item.

If the determination is made that the item is to be stocked, an initial buy is made for the item. The buy quantity is the sum of the requirements associated with the Administrative Leadtime (ALT), PLT, safety level, and procurement cycle. The time periods for these inventory factors are fixed for new items. The quantities for these factors are calculated using the SSR replenishment quantity.

The SSR retail quantity for new items may be considered an additive quantity to the Procurement Cycle (PC) quantity. The procedure used is to compare the retail quantity to the PC quantity. If the retail quantity is greater than the PC quantity, then the difference between the two is considered to be an additional requirement.

For items which are already established in the DLA system, the replenishment quantity on the SSR is not used at all. The procedure used for the retail quantity is the same as it is for a new item; that is, the difference between the retail quantity and the PC quantity is considered to be an additive requirement.

Along with the retail and replenishment quantities, the Service provides DLA with the date on which they anticipate needing the item. For new items, this date (known as the Date Repair Parts Required or DRPR) marks the beginning of the Demand Development Period (DDP). The DDP is a two-year period during which the item remains designated a "new" item and is forecasted differently from established items. The forecast procedure for new items involves a weighting of the actual demand experienced and the SSR replenishment quantity. This Quarterly Forecast of Demand (QFD) for new items (QFDNEW) is used in requirements calculations for two years, or until the standard demand-based QFD exceeds the QFDNEW.

B. Provisioning Policy Alternatives

The alternative policies which were examined in this study were developed by DLA-OSR. The policies involve various ways of using three different SSR quantities: the retail quantity for new items (initial SSRs), the retail quantity for established items (follow-on SSRs), and the replenishment quantity for established items (follow-on SSRs). For each of these three quantities, the study examined the current procedure plus two alternative procedures. The alternatives examined were as follows:

1. Retail quantities for initial SSRS.

   a. Discount by PC quantity (present policy).

   b. Use entire quantity.

   c. Use none of quantity.

2. Retail quantities for follow-on SSRs.

   a. Discount by PC quantity (current policy).

   b. Use entire quantity.

   c. Use none of quantity.

3. Replenishment quantities for follow-on SSRs.

   a. Use none of quantity (current policy).

   b. Add one-fourth of quantity to QFD for new items.

   c. Add one-fourth of quantity to QFD for new and established items.

Given that there were 3 policies (including the current policy) for each of the 3 quantities, combining these resulted in 27 possible policy runs (3x3x3). DLA-OSR excluded from consideration 6 of these combinations, leaving 21 policies to be examined (the current one plus 20 alternatives). Table 1 lists the various policies examined in the study. The table also provides a numeric code number for each of the 21 policies. For ease of presentation, these numeric codes will be used throughout the remainder of this report as a "shorthand" way of referring to the various policies. The current policy, for example, will be referred to as Policy 111.

III. METHODOLOGY

A. Data and Sample Selection. Two different samples were examined in the study. The first sample consisted of 11 quarters of data for 4,566 new and established NSNs. The second sample consisted of 16 quarters of data for 3,465 new NSNs only.

1. First Sample: New and Established Items

The first step in the development of the database used in the study was to obtain historical SSR information. This was accomplished by obtaining copies of the Provisioning Control History File (PCHF), which maintains approximatel, two years of SSR data. Several "snapshots" of the PCHF were obtained between March and August 1986. These files contained SSRs which were received by the DSCs from FY83 through the third quarter of FY86.

The SSRs in each of the PCHFs were screened based on the Action Taken Code (ATC) in the PCHF. Since the file contains entries for various types of actions by the Services and DLA concerning an item, this screening assured that only SSRs for items to be supported by DLA would be included. Only those PCHF records with ATCs of 'YA' (support as a replenishment item), 'YD' (support as a nonstocked item) or 'YE' (support as an NSO or replenishment item) were included.

Table 1

Policy Alternatives Included in the Study

Code	Quantity		
	Initial Retail	Follow-On Replenishment	Follow-On Retail
111	Discount by PC Qty	Use none	Discount by PC Qty
112	"	" "	Use All
113	"	" "	Use None
121	"	Add 25% to QFDNEW	Discount by PC Qty
122	"	" "	Use All
123	"	" "	Use None
131	"	Add 25% to QFDNEW/QFD	Discount by PC Qty
132	"	" "	Use All
133	"	" "	Use None
211	Use All	Use None	Discount by PC Qty
212	"	" "	Use All
213	"	" "	Use None
221	"	Add 25% to QFDNEW	Discount by PC Qty
222	"	" "	Use All
223	"	" "	Use None
231	"	Add 25% to QFDNEW/QFD	Discount by PC Qty
232	"	" "	Use All
233	"	" "	Use None
313	Use None	Use None	Use None
323	"	Add 25% to QFDNEW	"
333	"	Add 25% to QFDNEW/QFD	"

Once the PCHFs had been screened, they were combined into a single file. In this process, SSRs with duplicate identifier numbers (the first 15 positions of the record), with missing NSNs, or with submission dates prior to October 1982 or subsequent to June 1986 were dropped from consideration. This process resulted in a total of 2,591,987 SSRs which had been received by the hardware DSCs during the 15 quarters from the beginning of FY83 through the end of the third quarter of FY86.

The next step in the data collection process was to select a sample of items to be run through the provisioning model. Since all of the SSRs for a given item were needed, the units sampled were NSNs, not SSRs.

The approximately 2.6 million SSRs on the PCHFs represented a total of 520,784 NSNs. It was determined that a 1% sample of these NSNs would be adequate to evaluate the alternative policies.

The sample was selected by stratifying across two variables: (1) the DSC managing the item, and (2) whether there was an SSR establishing the item as being new to DLA. The latter factor was considered to be important since the procedures for handling initial and follow-ons differed and since the policies to be examined included both types of items. The actual procedures followed in selecting the sample was to divide the population of NSNs into the eight groups formed by the combination of the four commodities and whether or not the SSR creating the NSN was present (indicated by a source code of 'CXB' on the PCHF). Approximately 1% of the items in each of these categories were selected to be included in the sample. This procedure resulted in an initial sample of 5,066 items.

Due to problems in obtaining some of the other data elements required for the model (to be discussed shortly), only those SSRs received during the 10 quarters beginning with the second quarter of FY84 were included in the database. For this reason, 500 items from the original sample were lost, leaving a total of 4,566 items actually included in the sample.

Tables 2 through 4 show a comparison of the population and sample of NSNs in terms of commodity, service, and whether or not the item had an initial SSR during the time period under consideration. Table 2 shows that most of the items in the population are either Industrial or Electronics items. Industrial items were slightly underrepresented in the sample, while General items were slightly overrepresented.

Table 2

Commodities for Population and Sample Items

	Population		Sample	
Commodity	Number	Percentage	Number	Percentage
Construction	98,350	18.9	874	19.1
Electronics	156,140	30.0	1,442	31.6
General	49,039	9.4	468	10.2
Industrial	217,255	41.7	1,782	39.0

Table 3 shows the breakdown of the items by the Service submitting the first SSR (either the initial SSR or the first follow-on). Most of the items had SSRs submitted by the Navy, which had more than double the number of items of either the Army or the Air Force. When compared with the population, the sample had a slight overrepresentation of items from the Navy.

Table 3

Service Submitting First SSR for Population and Sample Items

	Population		Sample	
Commodity	Number	Percentage	Number	Percentage
Army	113,249	21.7	963	21.1
Air Force	122,936	23.6	1,073	23.5
Navy	276,735	53.2	2,467	54.0
Marine Corps	7,864	1.5	63	1.4

Table 4 shows the comparison of the population and sample number of items with an initial SSR versus those with follow-ons only. Items with initial SSRs comprised about one-third of the total items both the population and sample. The sample had a proportionally greater number of initial SSRs than did the population. Neither this difference nor any of the others noted above is considered to be large enough to compromise the validity of the analyses of the sample items.

Table 4

Items With Initial SSR in Population and Sample

	Population		Sample	
SSR Status	Number	Percentage	Number	Percentage
Initial SSR	164,487	31.6	1,536	33.6
Follow-Ons Only	356,297	68.4	3,030	66.4

The remaining data elements were extracted from files in the DLA Integrated Data Bank (DIDB) maintained by the Operations Research Office. As noted above, a problem was encountered in attempting to find data with which to initialize the model. For established items with follow-on SSRs, a beginning status with regard to inventory levels, stock dues-in, and backorders was not available in the DIDB files prior to FY84. Therefore, the model runs were limited to 10 quarters of SSRs beginning with the second quarter of FY84. However, DLA-OSR requested that requisitions for the fourth quarter of FY86 be included in the database. The model was thus run for 11 quarters, but with only 10 quarters of SSRs.

Starting inventory levels, backorders, and dues-in for established items were taken from DIDB files as of the end of the first quarter of FY84. For the 3,030 established items in the sample, there were a total of 634 dues-in and 603 backorders on file.

All of the SSRs for the 4,566 sample items were obtained from the PCHF. There were a total of 13,609 SSRs for the sample items.

Actual requisitions for the sample items for the 11 quarters from the second quarter of FY84 through FY86 were obtained from the DIDB's Requisition History Files. There were a total of 65,871 requisitions for the sample items.

Information concerning leadtimes and prices were also obtained from the database files. Actual leadtimes, by quarter, were obtained from Supply Control Files for each of the 11 quarters used in the study. The unit price for each item was also obtained from the Supply Control File.

2. Second Sample: New Items Only

The second sample used in the study consisted of 3,465 NSNs for which initial SSRs were received during the 15-quarter period from October 1982 to June 1986. These items required no beginning asset position, which is the reason that all of the SSR data could be included in the analysis.

The procedure described above for selecting the first sample was also used to arrive at this second set of items. There was a total of 6,413 SSRs for the sample items. This total included the initial SSR for each item and all subsequent follow-on SSRs for the item.

Requisitions were obtained for 16 quarters beginning with the first quarter of FY83 and ending with the fourth quarter of FY86. There were 27,262 requisitions received for the sample items.

To summarize, a database of about 2.6 million SSRs, representing about 521,000 NSNs, was the starting point for the data used in the study. Two random samples of these items were taken. The first sample consisted of 4,566 new and established NSNs. A total of 11 quarters of data was available for the items in this sample. The second sample consisted of 3,465 new NSNs only. There were 16 quarters of data available for the analysis of this second sample.

B. Model Description

The provisioning model developed for this study consists of a series of Fortran programs and subroutines which model the basic inventory calculations and processes of the SAMMS. The standard SAMMS functions performed by the model include: processing requisitions, establishing and releasing backorders, making buys and processing dues-in, monthly and quarterly forecasting, and monthly and quarterly accumulation of output measures such as demand frequency and quantity, supply availability, and dollar value of commitments and on-hand assets. Returns and disposals were not included in the model.

Several subroutines were included in the model to handle various aspects of the provisioning processing. The first of these was invoked whenever an SSR was received, and included the logic for handling the different policy alternatives associated with the follow-on retail and replenishment quantities. First, the appropriate additive amount was determined for both the retail and replenishment quantities according to which policy was in effect for that particular run. For the alternatives associated with the SSR replenishment quantity, the appropriate amount was added to the QFD and/or the QFDNEW, depending on the policy in effect. The amount was added to the QFD for each forecast carried out prior to the DRPR date. Once the DRPR date was reached, the additive requirement was dropped. For the additional quantity associated with the SSR retail amount, the appropriate requirement was added to either the procurement cycle or the reorder point, depending on whether or not the DRPR date fell within the leadtime for the item. Once the DRPR date was met, the additive requirement was dropped.

Another subroutine performed the calculations related to the establishment of the levels for a new item from its initial SSR. The first function of the subroutine was to determine if the item should be stocked, nonstocked, or NSO. If the initial SSR had a source code of 'PB', the item was made an NSO (ICC 'B') item. If the SSR replenishment quantity was greater than or equal to 12, the item was considered a stocked item (ICC '1'). If the replenishment quantity was less than 12, the stocked/nonstocked tables were consulted. The tables used for each of the DSCs are shown in Appendix A. If an item did not meet the stock criterion in the tables, it was made a nonstocked item. If the item did meet the table criterion, it become an NSO (ICC '2') item. An exception to this rule was that any item which was coded as a weapon system item with an essentiality code of 1, 5, 6 or 7 was made a stocked item, even if it failed to meet the table criterion. Throughout the course of the model run, any nonstocked item with two or more requisitions was switched to NSO status. Any NSO item with 3 or more requisitions for a quantity of 12 or more during the course of a year was converted to stocked status.

If the item was stocked or NSO, fixed inventory levels were assigned. The logic for handling the proposed policy alternatives based on the initial retail quantity was then applied to determine the provisioning quantity to be added to the initial buy for the item. The initial buy was then made and the due-in scheduled.

Finally, a separate subroutine handled forecasting for new items. Those items for which the initial SSR was present were considered to be new items until the DRPR date plus two years, or until the QFD exceeded the QFDNEW. Once these items experienced their first demand, forecasting using this subroutine began.

The subroutine computed the standard QFD and the QFDNEW. The latter quantity was computed by differentially weighting actual demand and the replenishment quantity from the SSR. Calculations such as the Mean Absolute Deviation (MAD) of the forecast and the forecasted leadtime demand use the QFDNEW for these new items. If the QFD exceeded the QFDNEW (or at the end of two years), the item was converted to established, and the regular exponential smoothing forecast only was applied.

These, then, are the basic components of the provisioning model. The model is event-oriented, moving through time event by event, one item at a time. The major events include receipt of a requisition, receipt of an SSR, receipt of a due-in, the end of a month, and the end of a quarter. Events which occur on the same day are prioritized so that, for example, dues-in are processed before requisitions occuring on the same day. The model continues in this fashion until the last day of the 11- or 16-quarter period.

Output statistics from the model were accumulated quarterly for each item in the two samples. Summary statistics for each item by quarter were written to an output file for further analysis. Summary statistics for all the items in each of the samples were printed for each quarter, and a final summary for all items and all quarters was also printed.

The output measures to be produced by the model were identified in advance by DLA-OSR. They included: dollar value of commitments, dollar value of demand, dollar value of inventory (on hand and due in), backorders established, backorders on file (at the end of the quarter), dollar value of backorders established, supply available percentage, average number of days to release a backorder, and number of buys initiated. The latter variable was broken out into 11 categories based on the dollar value of the buy.

Each run of the model represented one policy alternative. Thus, the model was run 21 times, and each item in each sample had 21 sets of output measures. The output measures were then compared statistically to determine where differences between the 21 policies existed.

IV. RESULTS

A. First Sample: New and Established Items[1]

Of the 4,566 sample items, 746 were classified as nonstocked, while 1,609 were NSO items. During the 11-quarter time period, 115 items were changed from nonstocked to NSO, and 336 were changed from NSO to stocked. The total quantity of demand for these NSNs was 4,726,575 units. The total dollar value of the demand was $9,942,616.

Further examination of the requisition data for these items showed that 68% of the items with initial SSRs and 26% of those with follow-ons only had no demand in the 11 quarters of data examined. An additional 11% of items with initial SSRs and 12% of items with follow-ons had only 1 requisition during the 11 quarters examined.

A similar examination of the SSRs for the sample items showed that 47% of initial SSRs had a retail quantity of 0, and another 18% had a retail quantity of 1. About 90% of the initial SSRs had retail quantities of 15 or less.

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[1]Results for each of the Services are shown in Appendices B and C.

For the follow-ons, 60% had retail quantities of 0, and another 13% had retail quantities of 1. About 90% of the follow-ons had retail quantities of 10 or less. Looking at the replenishment quantities, 13% of the follow-on SSRs had replenishment quantities of 0, and 41% had replenishment quantities of 1. The replenishment quantity was 20 or less for 90% of the follow-on SSRs.

Table 5 shows the model output results for seven outcome measures: total dollar value of commitments, average dollar value of inventory (on-hand plus due-in), backorders established, supply availability, average days on backorder, dollar value of backorders, and total number of buys. The first column of the table shows the policy number (see Table 1). The remaining columns provide the totals of each variable for all items and all quarters of that policy run.

Next to each quantity in the table is a percentage. This represents the difference between that policy and the current policy (shown on the first row of the table) for the variable under consideration. A positive percentage indicates that the variable value for the policy was greater than that of the current policy. As an example, Policy 112 produced commitments of $18,747,100. This was 0.7% greater than the dollar value of commitments produced by the current policy ($18,620,769).

The most striking feature of Table 5 is the obvious inverse relationship between commitments and inventory on the one hand and backorders, dollar value of backorders, and days on backorder on the other. In most cases, when one of these factors is significantly higher than the current policy, the other factor is significantly lower. As an example, Policy 313 (using none of the SSR quantities) results in 3.5% decrease in the dollar value of commitments, and a 1.8% decrease in the dollar value of inventory. There were, however, 1.8% more backorders and the average time on backorder was 1.9% greater. This relationship, while not surprising, is an important one which will be discussed again shortly.

An analysis was undertaken in order to assess the statistical significance of the differences observed in Table 5. The analysis involved a series of planned comparisons between the six outcome measures' values (excluding supply availability) for the current policy and each of the alternative policies. Due to the large number of comparisons involved, a significance level (alpha) of .009 was used for all comparisons.

The results of this analysis showed that few of the differences shown in Table 5 were statistically significant (significant differences are denoted in the table by an asterisk). The results can be summarized as follows:

1. There were no statistically significant differences between the current policy and the alternative policies in total dollars committed.

2. Policy 232 produced a significantly greater dollar value of assets than the current policy.

Table 5

Outcome Measures for Alternative Policies: Sample 1

Policy	Commitments Dollars		Asset Dollars		S/A	Backorders		Backorder Dollars		Buys		Backorder Days	
111	18,620,769		15,361,308		86.0%	9,031		2,688,286		7,346		14.57	
112	18,747,100	0.7%	15,540,544	1.2%	87.3%	8,138	-9.9%*	2,603,418	-3.2%*	7,393	0.6%	14.47	-0.7%*
113	18,090,557	-2.8%	15,198,499	-1.1%	85.8%	9,132	1.1%	2,702,077	0.5%	7,303	-0.6%	14.81	1.6%*
121	18,669,429	0.3%	15,378,506	0.1%	86.0%	9,017	-0.2%	2,687,423	.0%	7,263	-1.1%	14.64	0.5%
122	18,786,127	0.9%	15,515,176	1.0%	87.2%	8,203	-9.2%*	2,650,016	-1.4%	7,283	-0.9%	14.6	0.2%
123	18,148,613	-2.5%	15,219,300	-0.9%	85.8%	9,160	0.8%	2,700,599	0.5%	7,283	-0.9%	14.74	1.2%*
131	18,984,266	2.0%	16,019,812	4.3%	86.8%	8,513	-5.7%	2,630,368	-2.2%*	7,226	-1.6%	14.44	-0.9%
132	19,115,744	2.7%	16,106,052	4.8%	87.4%	8,087	-10.5%*	2,602,950	-3.2%*	7,221	-1.7%	14.33	-1.6%
133	18,441,577	-1.0%	15,847,366	3.2%	86.6%	8,609	-4.7%	2,645,517	-1.6%	7,269	-1.0%	14.54	-0.2%
211	18,640,668	0.1%	15,388,975	0.2%	86.0%	9,018	-0.1%	2,684,772	-0.1%	7,314	-0.4%	14.55	-0.1%
212	18,762,673	0.8%	15,567,898	1.3%	87.4%	8,125	-10.0%*	2,599,903	-3.3%*	7,361	0.2%	14.44	-0.9%*
213	18,110,998	-2.7%	15,226,408	-0.9%	85.8%	9,119	1.0%	2,698,562	0.4%	7,273	-1.0%	14.79	1.5%*
221	18,688,608	0.4%	15,405,756	0.3%	86.0%	9,004	-0.3%	2,683,909	-0.2%	7,232	-1.6%	14.62	0.3%
222	18,800,033	1.0%	15,542,504	1.2%	87.3%	8,190	-9.3%*	2,646,502	-1.6%	7,253	-1.3%	14.57	0.0%
223	18,168,209	-2.4%	15,246,705	-0.7%	85.9%	9,087	0.6%	2,697,085	0.3%	7,253	-1.3%	14.72	1.0%*
231	19,003,445	2.1%	16,047,062	4.5%	86.8%	8,500	-5.9%	2,626,854	-2.3%*	7,195	-2.1%*	14.42	-1.0%
232	19,129,649	2.7%	16,133,380	5.0%*	87.4%	8,074	-10.6%*	2,599,436	-3.3%*	7,191	-2.1%*	14.3	-1.9%*
233	18,461,173	-0.9%	15,874,771	3.3%	86.6%	8,596	-4.8%	2,642,002	-1.7%	7,239	-1.5%	14.52	-0.3%
313	17,964,787	-3.5%	15,086,678	-1.8%	85.7%	9,197	1.8%	2,711,115	0.8%	7,326	-0.3%	14.85	1.9%*
323	18,023,406	-3.2%	15,107,382	-1.7%	85.7%	9,165	1.5%	2,709,637	0.8%	7,305	-0.6%	14.78	1.4%*
333	18,316,369	-1.6%	15,735,448	2.4%	86.5%	8,674	-4.0%	2,654,555	-1.3%	7,291	-0.7%	14.59	0.1%

3. Six policies (112, 122, 132, 212, 222, 232) produced significantly fewer backorders than the current policy. Three of these (112, 212, 232) also produced a significantly lower dollar value of backorders and average days on backorder than the current policy.

4. Two policies (231, 232) produced a significantly lower total number of buys than the current policy.

Table 6 shows the number of buys and the percentage differences for each of the 11 buy categories. The statistical analysis of this data again showed few significant differences:

1. Two policies (231, 232) produced significantly fewer buys in the $0-$50 range than the current policy. In addition, Policy 232 produced fewer buys in the $51-$100 range.

2. Policy 233 produced significantly fewer buys in both the $51-$100 range and $20,000-$25,000 range than the current policy.

3. Policy 133 produced fewer buys in the $10,000-$15,000 range, and in the $20,000-$25,000 range than the current policy.

B. Second Sample: New Items Only

The analyses described above were also carried out for the sample of new items only. Of these 3,468 NSNs, 1,698 were classified as nonstocked, and 865 were NSO items. During the 16-quarter time period, 483 items were changed from nonstocked to NSO, while 423 were changed from NSO to stocked. The total quantity demanded for these NSNs was 5,703,781 units, for a total dollar value of $7,196,671.

Sixty-two percent of the NSNs in the sample had no demand in the 16-quarters of data examined. An additional 10% had only one requisition during this time period.

Examination of the SSRs showed that 40% of the initial SSRs had a retail quantity of 0, and another 26% had a quantity of 1. About 90% of the initial SSRs had retail quantities of 10 or less.

For the follow-ons, 44% had retail quantities of 0, and another 22% had quantities of 1. About 90% of the follow-ons had retail quantities of 15 or less. Looking at the replenishment quantities, 19% of the SSRs had quantities of 0, while 24% had quantities of 1. The replenishment quantity was 22 or less for 90% of the follow-on SSRs.

Table 7 shows the model output results for the items in the second sample. The findings shown in the table may be summarized as follows:

1. Three policies (313, 323, 333) produced significantly lower asset dollars than the current policy. One of these (Policy 313) also produced a significant decrease in asset dollars as compared to the current policy.

Table 6

Number of Buys By Dollar Value Category: Sample 1

Policy	$0-$50		$51-$100		$101-$500		$500-$1000		$1000-$2500		$2501-$5000		$5001-$10000		$10001-$15000		$15001-$20000		$20001-$25000		$25000+	
111	3,064		685		1,321		458		723		441		310		111		68		44		121	
112	3,090	0.8%	681	-0.6%	1,329	0.6%	458	0.0%	727	0.6%	450	2.0%	310	0.0%	111	0.0%	73	7.4%	41	-6.8%	123	1.7%
113	3,051	-0.4%	669	-2.3%	1,317	-0.3%	459	0.2%	726	0.4%	439	-0.5%	303	-2.3%	111	0.0%	68	0.0%	41	-6.8%	119	-1.7%
121	3,005	-1.9%	671	-2.0%	1,314	-0.5%	450	-1.7%	722	-0.1%	445	0.9%	313	1.0%	110	-0.9%	68	0.0%	44	0.0%	121	0.0%
122	3,014	-1.6%	667	-2.6%	1,318	-0.2%	454	-0.9%	720	-0.4%	451	2.3%	311	0.3%	111	0.0%	73	7.4%	41	-6.8%	123	1.7%
123	3,035	-0.9%	667	-2.6%	1,312	-0.7%	454	-0.9%	728	0.7%	443	0.5%	306	-1.3%	110	-0.9%	68	0.0%	41	-6.8%	119	-1.7%
131	2,960	-3.4%	679	-2.2%	1,295	-2.0%	444	-3.1%	747	3.3%	443	0.5%	313	1.0%	121	9.0%	71	4.4%	41	-6.8%	121	0.0%
132	2,950	-3.7%	666	-2.8%	1,298	-1.7%	448	-2.2%	732	1.2%	458	3.9%	314	1.3%	121	9.0%	70	2.9%	42	-4.5%	122	0.8%
133	3,019	-1.5%	665	-2.9%	1,296	-1.9%	443	-3.3%	749	3.6%	436	-1.1%	312	0.6%	125	12.6% *	71	4.4%	34	-22.7% *	119	-1.7%
211	3,040	-0.8%	674	-1.6%	1,327	0.5%	457	-0.2%	718	-0.7%	443	0.5%	312	0.6%	109	-1.8%	69	1.5%	43	-2.3%	122	0.8%
212	3,069	0.2%	669	-2.3%	1,333	0.9%	458	0.0%	722	-0.1%	451	2.3%	312	0.6%	109	-1.8%	74	8.8%	40	-9.1%	124	2.5%
213	3,029	-1.1%	658	-3.9%	1,323	0.2%	457	-0.2%	722	-0.1%	441	0.0%	305	-1.6%	109	-1.8%	69	1.5%	40	-9.1%	120	-0.8%
221	2,982	-2.7%	660	-3.6%	1,320	-0.1%	449	-2.0%	717	-0.8%	447	1.4%	315	1.6%	108	-2.7%	69	1.5%	43	-2.3%	122	0.8%
222	2,994	-2.3%	655	-4.4% *	1,322	0.1%	454	-0.9%	715	-1.1%	453	2.7%	313	1.0%	109	-1.8%	74	8.8%	40	-9.1%	124	2.5%
223	3,013	-1.7%	656	-4.2%	1,318	-0.2%	452	-1.3%	724	0.1%	445	0.9%	308	-0.6%	108	-2.7%	69	1.5%	40	-9.1%	120	-0.8%
231	2,937	-4.1% *	659	-3.8%	1,301	-1.5%	443	-3.3%	742	2.6%	445	0.9%	315	1.6%	119	7.2%	72	5.9%	40	-9.1%	122	0.8%
232	2,930	-4.4% *	654	-4.5% *	1,302	-1.4%	448	-2.2%	727	0.6%	460	4.3%	316	1.9%	119	7.2%	71	4.4%	41	-6.8%	123	1.7%
233	2,997	-2.2%	654	-4.5% *	1,302	-1.4%	441	-3.7%	745	3.0%	438	-0.7%	314	1.3%	123	10.8%	72	5.9%	33	-25.0% *	120	-0.8%
313	3,046	-0.6%	706	3.1%	1,338	1.3%	453	-1.1%	709	-1.9%	438	-0.7%	301	-2.9%	113	1.8%	66	-2.9%	38	-13.6%	118	-2.5%
323	3,028	-1.2%	704	2.8%	1,335	1.1%	447	-2.4%	711	-1.7%	442	0.2%	304	-1.9%	112	0.9%	66	-2.9%	38	-13.6%	118	-2.5%
333	3,012	-1.7%	702	2.5%	1,319	-0.2%	436	-4.8%	732	1.2%	435	-1.4%	310	0.0%	127	14.4% *	69	1.5%	31	-29.5% *	118	-2.5%

Table 7

Outcome Measures for Alternative Policies: Sample 2

Policy	Commitments Dollars		Asset Dollars		S/A	Backorders		Backorders Dollars		Buys		Backorder Days	
111	10,151,630		5,170,252		49.8%	6,321		2,578,791		4,784		14	
112	10,205,384	0.5%	5,196,949	0.5%	50.3%	6,263	-0.9%	2,565,005	-0.5%	4,793	0.2%	13.96	-0.3%
113	10,108,588	-0.4%	5,138,930	-0.6%	48.9%	6,433	1.8%	2,590,125	0.4%	5,021	5.0%	14.02	0.1%
121	10,361,642	2.1%	5,215,425	0.9%	49.9%	6,315	-0.1%	2,562,739	-0.6%	4,746	-0.8%	13.96	-0.3%
122	10,387,986	2.3%	5,230,569	1.2%	50.1%	6,285	-0.6%	2,554,681	-0.9%	4,735	-1.0%	13.95	-0.4%
123	10,264,186	1.1%	5,182,741	0.2%	49.5%	6,365	0.7%	2,571,145	-0.3%	5,020	4.9%	14.02	0.1%
131	10,462,800	3.1%	5,247,470	1.5%	50.5%	6,232	-1.4%	2,556,125	-0.9%	4,754	-0.6%	13.96	-0.3%
132	10,488,091	3.3%	5,261,737	1.8%	50.7%	6,203	-1.9%	2,549,200	-1.1%*	4,742	-0.9%	13.95	-0.4%
133	10,367,553	2.1%	5,215,271	0.9%	50.5%	6,238	-1.3%	2,562,515	-0.6%	4,792	0.2%	14.01	0.1%
211	10,296,962	1.4%	5,329,918	3.1%	50.1%	6,289	-0.5%	2,564,000	-0.6%	4,687	-2.0%	13.79	-1.5%
212	10,316,542	1.6%	5,344,269	3.4%	50.5%	6,240	-1.3%	2,550,441	-1.1%	4,698	-1.8%	13.76	-1.7%
213	10,256,732	1.0%	5,300,616	2.5%	49.2%	6,398	1.2%	2,575,250	-0.1%	4,927	3.0%	13.8	-1.5%
221	10,502,722	3.5%	5,374,852	4.0%	50.1%	6,281	-0.6%	2,547,932	-1.2%*	4,653	-2.7%	13.75	-1.8%
222	10,526,941	3.7%	5,386,318	4.2%	50.3%	6,260	-1.0%	2,540,121	-1.5%*	4,645	-2.9%	13.75	-1.8%
223	10,405,984	2.5%	5,342,799	3.3%	49.7%	6,330	0.1%	2,556,334	-0.9%	4,923	2.9%	13.8	-1.5%
231	10,603,842	4.5%	5,406,640	4.6%	50.8%	6,198	-1.9%	2,541,318	-1.5%*	4,662	-2.6%	13.75	-1.8%
232	10,627,047	4.7%	5,417,482	4.8%	50.9%	6,178	-2.3%	2,534,640	-1.7%*	4,653	-2.7%	13.75	-1.8%
233	10,509,314	3.5%	5,375,073	4.0%	50.7%	6,203	-1.9%	2,547,704	-1.2%*	4,696	-1.8%	13.79	-1.5%
313	9,419,124	-7.2%*	4,470,171	-13.5%*	47.0%	6,679	5.7%*	2,623,065	1.7%*	5,289	10.6%*	14.27	2.0%*
323	9,629,356	-5.1%	4,534,276	-12.3%*	47.8%	6,578	4.1%*	2,598,821	0.8%	5,275	10.3%*	14.22	1.6%*
333	9,732,673	-4.1%	4,566,544	-11.7%*	48.8%	6,451	2.1%	2,590,191	0.4%	5,047	5.5%	14.21	1.5%*

2. Two policies (313, 323) produced significantly more backorders and greater length of time on backorder than the current policy. One of these (313) also produced a significantly larger backorder dollar amount than the current policy.

3. A total of six policies (132, 221, 222, 231, 232, 233) produced significant reductions in backorder dollars when compared with the current policy.

4. Two policies (313, 323) produced a significantly greater number of buys than the current policy.

Table 8 shows the number of buys in each dollar value category. Policies 313 and 232 produced a greater number of buys than the current policy in the four smallest buy categories (under $1,000). These same policies also produced significantly fewer buys, between $2,500-$10,000.

C. Additional Analyses

At the request of DLA-OSR, two additional provisioning policies were evaluated. The first policy involved the amount of stock to purchase for the initial buy for a new SSR. Currently, the initial buy is based on the reorder point quantity and the procurement cycle quantity. The first alternative policy examined was to base the initial buy on the reorder point only.

The second policy examined was to delay the initial buy for an item until after the first demand was received. This policy would result in the first requisition for a new item being placed on backorder. However, if no requisitions were received for the item, then no initial buy would be made.

Both of these alternative policies were compared to the current policy using the 11-quarter sample only. Matched-pairs t-tests were used to determine the statistical significance of the differences observed for the outcome measures. The results of these analyses are shown in Table 9.

The policy of delaying the first buy produced significant decreases in commitment and asset dollars, and corresponding increases in backorders, backorder dollars, and days on backorder. This policy also produced significantly fewer buys than the current policy.

The policy of buying the reorder point only for the initial buy produced small but statistically significant decreases in asset and commitment dollars, with a corresponding increase in the number of backorders. Small increases were observed in backorder dollars, days on backorder, and number of buys, but none was statistically significant.

Table 10 shows the comparison of the number of buys in each dollar value category. The policy of delaying the first buy produces significantly fewer buys in all categories under $10,000. None of the differences for the reorder point only policy was statistically significant.

Table 6

Number of Bills By Dollar Value Category: Sample 2

Policy	$0-$50		$51-$100		$101-$500		$501-$1000		$1001-$2500		$2501-$5000		$5001-$10000		$10001-$15000		$15001-$20000		$20001-$25000		$25000+	
111	1,832		578		1,072		378		355		188		184		83		31		27		56	
112	1,833	0.1%	569	-1.6%	1,082	0.9%	380	0.5%	356	0.8%	189	0.5%	184	0.0%	83	0.0%	31	0.0%	27	0.0%	57	1.8%
113	2,033	11.0%	608	5.2%	1,092	1.9%	384	1.6%	343	-3.4%	182	-3.2%	182	-1.1%	83	0.0%	31	0.0%	27	0.0%	56	0.0%
121	1,800	-1.7%	580	0.3%	1,067	-0.5%	380	0.5%	345	-1.7%	182	-3.2%	183	-0.5%	86	3.6%	33	6.5%	27	0.0%	59	5.4%
122	1,786	-2.5%	566	-1.7%	1,074	0.2%	383	1.3%	351	-1.1%	185	-1.6%	181	-1.6%	87	4.8%	33	6.5%	27	0.0%	60	7.1%
123	2,031	10.9%	611	5.7%	1,086	1.3%	384	1.6%	343	-3.4%	181	-3.7%	179	-2.7%	86	3.6%	33	6.5%	27	0.0%	59	5.4%
131	1,800	-1.7%	584	1.0%	1,071	-0.1%	379	0.3%	344	-3.1%	189	0.5%	182	-1.1%	87	4.8%	29	-6.5%	28	3.7%	61	8.9%
132	1,787	-2.5%	571	-1.2%	1,080	0.7%	379	0.3%	347	-2.3%	191	1.6%	180	-2.2%	88	6.0%	29	-6.5%	28	3.7%	62	10.7%
133	1,823	-0.5%	594	2.6%	1,081	0.8%	378	0.0%	344	-3.1%	189	0.5%	178	-3.3%	87	4.8%	29	-6.5%	28	3.7%	61	8.9%
211	1,748	-4.6%	563	-2.6%	1,074	0.2%	379	0.3%	356	0.3%	187	-0.5%	180	-2.2%	88	6.0%	27	-12.9%	27	0.0%	58	3.6%
212	1,754	-4.3%	554	-4.2%	1,082	0.9%	380	0.5%	360	1.4%	188	0.0%	181	-1.6%	87	4.8%	27	-12.9%	27	0.0%	58	3.6%
213	1,951	6.5%	595	2.9%	1,092	1.9%	385	1.9%	345	-2.8%	181	-3.7%	178	-3.3%	88	6.0%	27	-12.9%	27	0.0%	58	3.6%
221	1,723	-5.9%	561	-2.9%	1,070	-0.2%	381	0.8%	351	-1.1%	180	-4.3%	178	-3.3%	92	10.8%	29	-6.5%	27	0.0%	61	8.9%
222	1,713	-6.5%	552	-4.5%	1,075	0.3%	383	1.3%	352	-0.8%	184	-2.1%	177	-3.8%	92	10.8%	29	-6.5%	27	0.0%	61	8.9%
223	1,949	6.4%	594	2.8%	1,086	1.5%	384	1.6%	345	-2.8%	180	-4.3%	175	-4.9%	91	9.6%	29	-6.5%	27	0.0%	61	8.9%
231	1,724	-5.9%	565	-2.2%	1,074	0.2%	380	0.5%	346	-2.5%	187	-0.5%	177	-3.8%	93	12.0%*	25	-19.4%	28	3.7%	63	12.5%
232	1,715	-6.4%	555	-4.0%	1,081	0.8%	379	0.3%	348	-2.0%	190	1.1%	176	-4.3%	93	12.0%*	25	-19.4%	28	3.7%	63	12.5%
233	1,742	-4.9%	577	-0.2%	1,083	1.0%	378	0.0%	346	-2.5%	188	0.0%	174	-5.4%	92	10.8%	25	-19.4%	28	3.7%	63	12.5%
313	2,191	19.6%*	663	14.7%*	1,155	7.7%*	404	6.9%*	351	-1.1%	158	-16.0%*	170	-7.6%*	87	4.8%	29	-6.5%	27	0.0%	54	-3.6%
323	2,191	19.6%*	662	14.5%*	1,147	7.0%*	398	5.3%	348	-2.0%	156	-17.0%*	167	-9.2%*	89	7.2%	31	0.0%	27	0.0%	59	5.4%
333	1,983	8.2%	645	11.6%*	1,142	6.5%*	392	3.7%	349	-1.7%	164	-12.8%*	166	-9.8%*	90	8.4%	27	-12.9%	28	3.7%	61	8.9%

Table 9

Outcome Measures for Additional Policies

Policy	Commitments Dollars		Assets Dollars		S/A	Backorders		Backorder Dollars		Buys		Backorder Days	
Current	18,620,769		15,361,308		86.0%	9,031		2,683,285		7,346		14.57	
Delay	17,815,337	-4.3%*	14,546,127	-5.3%*	84.9%	9,720	7.6%*	2,795,638	4.0%*	6,913	-5.9%*	15.6	7.1%*
ROF Only	18,540,114	-0.4%*	15,280,374	-0.5%*	85.9%	9,067	0.4%*	2,694,366	0.2%	7,392	0.6%	14.6	0.2%

Table 10

Number of Buys By Dollar
Value Category: Additional Policies

Policy	$0-$50		$51-$100		$101-$500		$500-$1000		$1001-$2500		$2501-$5000		$5001-$10000		$10001-$15000		$15001-$20000		$20001-$25000		$25000+	
Current	3,064		685		1,321		458		723		441		310		111		68		44		121	
Delay	2,890	-5.7%*	631	-7.9%*	1,222	-7.5%*	430	-6.1%*	686	-5.1%*	421	-4.5%*	297	-4.2%*	108	-2.7%	68	0.0%	43	-2.3%	117	-3.3%
ROP Only	3,102	1.2%	681	-0.6%	1,341	1.5%	455	-0.7%	719	-0.6%	441	0.0%	310	0.0%	112	0.9%	68	0.0%	44	0.0%	119	-1.7%

V. DISCUSSION AND SUMMARY

The results of this study show that although there are differences produced by the various policy alternatives, these differences are not very dramatic. The most extreme alternative (ignoring all SSR quantities; Policy 313), for example, would result in only a 3.5% decrease in commitment dollars and a 1.8% increase in backorders (see Table 5).

There are several possible explanations for the relatively small differences observed. One explanation is that the actual quantities on the SSRs are quite low. About 65% of the initial SSRs had retail quantities of 0 or 1, and 90% had quantities of 15 or less. The follow-on amounts were equally small. Given these quantities, the difference between using all of the amount and none of the amount is not very large.

Another explanation for the size of the observed differences between policies is the length of time over which the model runs were made. Eleven quarters is not a very long period of time, and it is possible that the full effects of the various policies could not be clearly demonstrated. Some support for this explanation is offered by the results of the analysis of new items only. Using 16 quarters of data resulted in an 7.2% decrease in commitments and a 13.5% decrease in assets for Policy 313. Since these are new items only, however, the results cannot be attributed solely to the longer time period.

Despite these limitations and the relatively small magnitude of the differences between the policies, some of these differences were statistically significant. The findings here revealed three policies which produced significantly fewer backorders, a lower dollar value of backorders, and less time on backorder than the current policy in the first sample.

All three of these policies use all of the follow-on retail quantities. For the follow-on replenishment quantity, two policies use none of the quantity, while the third adds one-quarter of the quantity to the QFDs for new and established items. Finally, the policies use either the current discounting procedure for the initial retail quantity or use the entire quantity.

In addition to these differences, Policy 232 produced significantly fewer buys than the current policy, although this difference is limited to buys under $100. Policies 112 and 212 produced slightly more buys than the current policy.

All three of these policies produced increases in assets and commitments. Only the increase in assets from Policy 232 was large enough to be statistically significant.

Based on these results, Policies 112 and 212 appear to be the most successful. Both produced significant decreases in backorders, backorder dollars and backorder days, with only small corresponding increases in commitment and asset dollars. This pattern of differences was also seen in the sample of initials only, although none of the differences was statistically significantly there.

As noted previously, in all of these policies there is an inverse relationship between commitments and assets on the one hand, and backorders and backorder dollars on the other hand. This can be seen clearly in the results of the analyses of the reorder point and delay policies shown in Table 9. Here, there are significant decreases in commitment and asset dollars, but significant increases in backorders and backorder dollars. Thus, if reducing commitments and assets is the desired outcome, one of these alternatives (specifically, delaying the first buy until after the first demand) would be preferable to the two policies identified earlier.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions. The following conclusions are based on the results of the analysis of the alternative provisioning policies as discussed in this report:

-- There are small but statistically significantly differences between the current provisioning policy and several of the alternatives examined.

The percentage differences between the current policy and the alternative policies were rarely more than 10%. The most likely explanations for this finding are the very low quantities on the SSRs, and the relatively short time period over which the model runs were carried out.

-- There is a general inverse relationship between commitments and assets on the one hand and backorders, backorder dollars, and days on backorder on the other hand.

This finding held true across all of the various policies, although not all of the differences reached statistical significance.

-- Two of the alternative policies would result in significantly fewer backorders, lower dollar value of backorders, and fewer days on backorder than the current policy, with small corresponding increases in commitments and assets.

Both of these policies use all of the follow-on retail quantity and none of the follow-on replenishment quantity. For the initial retail quantity, one policy used the entire quantity, while the other used the amount discounted by the procurement cycle quantity (that is, the current procedure).

-- The policy of restricting the initial provisioning buy to the reorder point quantity only would result in significantly lower dollar value of assets and commitments, and significantly more backorders than the current policy.

This policy was compared to the current policy, which includes the procurement cycle quantity as part of the initial buy. The alternative policy produced small but statistically significant differences on the outcome measures noted above.

-- The policy of delaying the initial provisioning buy until after the first requisition has been received would result in significantly lower dollar value of commitments and assets, and significantly greater number of backorders, backorder dollars, and days on backorder than the current policy.

These differences were relatively pronounced and much larger than those observed for the alternative of limiting the initial buy to the reorder point only. This policy also produced significantly fewer buys than the current policy in all categories representing buys under $10,000.

B. Recommendations

If reducing backorders is the most important consideration, then the following procedures should be used:

-- discount the initial retail quantity by the procurement cycle quantity or use the entire initial retail quantity;

-- use all of the follow-on retail quantity; and

-- use none of the follow-on replenishment quantity.

These policies would reduce the number of backorders, the dollar value of backorders, and the average time on backorder. They would also produce small increases in commitment and asset dollars.

-- If reducing both commitment asset dollars is the most important consideration, then the policy of delaying the initial provisioning buy until the first demand is received should be implemented.

This policy would produce significant decreases in assets and commitments. These observed decreases were greater than these seen for the policy of limiting the initial buy to the reorder point quantity. This policy would, however, result in significant increases in backorders, backorder dollars, and average days on backorder.

APPENDIX A

Stocked/Nonstocked Tables for Commodities

Stocked/Nonstocked Table for DCSC
Required Forecasted Annual Demand (AD) Frequency for Stockage

PLT (Mos.) \ $ Value AD	$ 0.-100.	$101.-500.	$ 501.-2500.	$ 2501.-12500.	$12501.-62500.	$ 62501.-321500.
1	3	5	6	6	7	7
2	3	5	6	7	7	8
3	3	5	6	7	8	8
4	3	5	6	7	8	8
5	3	5	6	7	8	9
6	3	5	6	7	8	9
7	3	5	6	7	9	9
8	3	5	6	7	9	10
9	3	5	6	8	9	10
10	3	5	6	8	9	10
11	3	5	6	8	10	10
12	3	5	7	8	10	11
13	3	5	7	8	10	11
14	3	5	7	8	10	11
15	3	5	7	8	10	11

Stocked/Nonstocked Table for DESC
Required Forecasted Annual Demand (AD) Frequency for Stockage

PLT (Mos.) \ $ Value AD	$ 0.-100.	$101.-500.	$ 501.-2500.	$ 2501.-12500.	$12501.-62500.	$ 62501.-321500.
1	4	5	5	5	4	3
2	4	5	5	5	4	4
3	3	5	5	5	4	4
4	3	5	5	5	4	4
5	3	5	6	5	5	5
6	3	5	6	5	5	5
7	3	5	6	6	5	5
8	3	4	6	6	5	5
9	3	4	6	6	6	6
10	3	4	6	6	6	6
11	2	4	6	6	6	6
12	2	4	6	6	6	6
13	2	4	6	6	6	6
14	2	4	6	6	6	6
15	2	4	6	6	7	7

Stocked/Nonstocked Table for DGSC
Required Forecasted Annual Demand (AD) Frequency for Stockage

PLT (Mos.) \ $ Value AD	$ 0.- 100.	$101.- 500.	$ 501.- 2500.	$ 2501.- 12500.	$12501.- 62500.	$ 62501.- 321500.
1	4	5	7	6	7	7
2	4	5	7	6	7	7
3	4	5	7	6	7	8
4	3	5	7	6	7	8
5	3	5	7	6	8	8
6	3	5	7	6	8	8
7	3	5	7	6	8	9
8	3	5	7	6	8	9
9	3	5	7	7	8	9
10	3	5	7	7	9	10
11	3	5	7	7	9	10
12	3	5	7	7	9	10
13	3	5	7	7	9	10
14	3	5	7	7	9	11
15	3	5	7	7	10	11

Stocked/Nonstocked Table for DISC
Required Forecasted Annual Demand (AD) Frequency for Stockage

PLT (Mos.) \ $ Value AD	$ 0.- 100.	$101.- 500.	$ 501.- 2500.	$ 2501.- 12500.	$12501.- 62500.	$ 62501.- 321500.
1	3	5	6	6	7	7
2	3	5	6	7	7	8
3	3	5	6	7	8	8
4	3	5	6	7	8	8
5	3	5	6	7	8	9
6	3	5	6	7	8	9
7	3	5	6	7	9	9
8	3	5	6	7	9	10
9	3	5	6	8	9	10
10	3	5	6	8	9	10
11	3	5	6	8	10	10
12	3	5	7	8	10	11
13	3	5	7	8	10	11
14	3	5	7	8	10	11
15	3	5	7	8	10	11

Appendix B

Outcome Measures for Alternative Policies: By Service

Policy	Commitment Dollars		Asset Dollars		S/A	Backorders		Backorder Dollars		Buys		Backorder Days	
					AIR FORCE								
111	4,941,943		13,050,757		94.8%	804		284,908		4,202		14.69	
112	5,019,532	1.6%*	13,137,872	0.7%*	95.1%	761	-5.3%	280,863	-1.4%	4,240	0.9%*	14.58	-0.7%
113	4,930,793	-0.2%	13,044,782	-0.0%	94.8%	810	0.7%	285,929	0.4%	4,113	-2.1%*	14.76	0.5%
121	4,942,120	0.0%	13,050,336	-0.0%	94.8%	807	0.4%	285,024	0.0%	4,157	-1.1%*	14.69	0.0%
122	4,987,034	0.9%	13,108,454	0.4%*	95.1%	772	-4.0%	283,068	-0.6%	4,174	-0.7%	14.65	-0.3%
123	4,931,662	-0.2%	13,044,848	-0.0%	94.8%	810	0.7%	285,929	0.4%	4,112	-2.1%*	14.75	0.4%
131	5,003,290	1.2%	13,104,223	0.4%*	95.1%	767	-4.6%	277,515	-2.6%	4,153	-1.2%*	14.69	0.0%
132	5,029,421	1.8%*	13,126,182	0.6%*	95.1%	766	-4.7%	276,505	-2.9%	4,155	-1.1%*	14.56	-0.9%
133	4,987,898	0.9%	13,097,226	0.4%	95.1%	770	-4.2%	278,369	-2.3%	4,119	-2.0%*	14.75	0.4%
211	4,943,207	0.0%	13,052,044	0.0%	94.9%	797	-0.9%	282,628	-0.8%	4,179	-0.5%	14.6	-0.6%
212	5,020,774	1.6%*	13,139,147	0.7%*	95.2%	754	-6.2%	278,583	-2.2%	4,217	0.4%	14.48	-1.4%*
213	4,932,058	-0.2%	13,046,069	-0.0%	94.9%	803	-0.1%	283,649	-0.4%	4,092	-2.6%*	14.67	-0.1%
221	4,943,385	0.0%	13,051,623	0.0%	94.9%	800	-0.5%	282,745	-0.8%	4,136	-1.6%*	14.6	-0.6%
222	4,988,299	0.9%	13,109,741	0.5%*	95.1%	765	-4.9%	280,788	-1.4%	4,153	-1.2%*	14.55	-1.0%
223	4,932,927	-0.2%	13,046,135	-0.0%	94.9%	803	-0.1%	283,649	-0.4%	4,091	-2.6%*	14.66	-0.2%
231	5,004,555	1.3%*	13,105,510	0.4%*	95.1%	760	-5.5%	275,236	-3.4%	4,132	-1.7%*	14.6	-0.6%
232	5,030,685	1.8%*	13,129,469	0.6%*	95.1%	759	-5.6%	274,225	-3.7%*	4,134	-1.6%*	14.46	-1.6%
233	4,989,163	1.0%	13,098,513	0.4%	95.1%	763	-5.1%	276,089	-3.1%	4,098	-2.5%*	14.66	-0.2%
313	4,882,214	-1.2%	13,008,313	-0.3%	94.7%	830	3.2%	287,315	0.8%	4,134	-1.6%*	14.78	0.6%
323	4,883,084	-1.2%	13,008,379	-0.3%	94.7%	830	3.2%	287,315	0.8%	4,133	-1.6%*	14.76	0.5%
333	4,939,320	-0.1%	13,060,757	0.1%	94.9%	790	-1.7%	279,755	-1.8%	4,140	-1.5%*	14.76	0.5%

Appendix B (Cont.)

Outcome Measures for Alternative Policies: By Service

Policy	Commitment Dollars		Asset Dollars		S/A	Backorders		Backorder Dollars		Buys		Backorder Days	
						ARMY							
111	4,761,743		12,842,561			1,461		356,335		3,734		15.51	
112	4,827,454	1.4%	12,941,567	0.8%*	93.9%	1,394	-4.6%	317,425	-10.9%*	3,764	0.8%	15.43	-0.5%
113	4,678,288	-1.8%	12,811,056	-0.2%	93.3%	1,531	4.8%	365,710	2.6%	3,735	0.0%	15.61	0.6%
121	4,760,979	-0.0%	12,842,365	-0.0%	93.6%	1,467	0.4%	356,641	0.1%	3,713	-0.6%	15.61	0.6%
122	4,825,055	1.3%	12,913,309	0.6%	94.1%	1,360	-6.9%	335,321	-5.9%	3,741	0.2%	15.45	-0.4%
123	4,684,838	-1.6%	12,814,139	-0.2%	93.4%	1,514	3.6%	365,491	2.6%	3,718	-0.4%	15.62	0.7%
131	4,810,483	1.0%	12,881,839	0.3%	94.1%	1,358	-7.0%	344,061	-3.4%	3,712	-0.6%	15.55	0.3%
132	4,855,364	2.0%*	12,915,429	0.6%*	94.4%	1,285	-12.0%*	330,375	-7.3%	3,722	-0.3%	15.41	-0.6%
133	4,730,308	-0.7%	12,846,726	0.0%	93.8%	1,423	-2.6%	355,710	-0.2%	3,722	-0.3%	15.48	-0.2%
211	4,763,407	0.0%	12,844,718	0.0%	93.7%	1,455	-0.4%	356,082	-0.1%	3,775	1.1%	15.51	0.0%
212	4,827,729	1.4%	12,943,336	0.8%*	93.9%	1,389	-4.9%	317,186	-11.0%*	3,802	1.8%	15.42	-0.6%
213	4,679,792	-1.7%	12,813,066	-0.2%	93.4%	1,525	4.4%	365,457	2.6%	3,777	1.2%	15.61	0.6%
221	4,762,067	0.0%	12,844,222	0.0%	93.6%	1,461	0.0%	356,388	0.0%	3,755	0.6%	15.61	0.6%
222	4,826,119	1.4%	12,915,097	0.6%	94.1%	1,354	-7.3%	335,068	-6.0%	3,781	1.3%	15.45	-0.4%
223	4,686,342	-1.6%	12,816,152	-0.2%	93.4%	1,508	3.2%	365,238	2.5%	3,760	0.7%	15.62	0.7%
231	4,811,571	1.0%	12,883,696	0.3%	94.1%	1,352	-7.5%	343,808	-3.5%	3,754	0.5%	15.55	0.3%
232	4,856,428	2.0%*	12,917,218	0.6%*	94.4%	1,279	-12.5%*	330,122	-7.4%	3,762	0.7%	15.41	-0.6%
233	4,731,813	-0.6%	12,848,739	0.0%	93.8%	1,417	-3.0%	355,457	-0.2%	3,764	0.8%	15.48	-0.2%
313	4,634,153	-2.7%*	12,766,134	-0.6%*	93.2%	1,556	6.5%	366,934	3.0%	3,763	0.8%	15.66	1.0%
323	4,641,062	-2.5%*	12,769,275	-0.6%*	93.3%	1,539	5.3%	366,716	2.9%	3,748	0.4%	15.71	1.3%
333	4,686,533	-1.6%	12,801,863	-0.3%	93.7%	1,448	-0.9%	356,934	0.2%	3,752	0.5%	15.57	0.4%

Appendix B (Cont.)

Outcome Measures for Alternative Policies: By Service

Policy	Commitment Dollars		Asset Dollars		S/A	Backorders		Backorder Dollars		Buys		Backorder Days	
						NAVY							
111	10,823,897		13,889,158		87.2%	2,674		1,480,854		5,136		15.56	
112	10,852,674	0.3%	13,906,315	0.1%	87.3%	2,662	-0.4%	1,478,788	-0.1%	5,133	-0.1%	15.51	-0.3%
113	10,801,903	-0.2%	13,877,506	-0.1%	87.2%	2,684	0.4%	1,484,947	0.3%	5,137	0.0%	15.72	1.0%
121	10,864,856	0.4%	13,905,311	0.1%	87.3%	2,672	-0.1%	1,481,937	0.1%	5,122	-0.3%	15.6	0.3%
122	10,898,183	0.7%	13,926,315	0.3%	87.3%	2,662	-0.4%	1,480,909	0.0%	5,115	-0.4%	15.55	-0.1%
123	10,842,200	0.2%	13,893,179	0.0%	87.2%	2,682	0.3%	1,485,754	0.3%	5,135	-0.0%	15.67	0.7%
131	11,145,532	3.0%*	14,036,792	1.1%*	87.9%	2,547	-4.7%*	1,461,222	-1.3%*	5,128	-0.2%	15.47	-0.6%
132	11,174,889	3.2%*	14,053,512	1.2%*	87.9%	2,543	-4.9%*	1,459,676	-1.4%*	5,114	-0.4%	15.44	-0.8%
133	11,105,974	2.6%*	14,018,595	0.9%*	87.8%	2,557	-4.4%*	1,465,039	-1.1%	5,141	0.1%	15.58	0.1%
211	10,833,261	0.1%	13,899,970	0.1%	87.3%	2,666	-0.3%	1,478,336	-0.2%	5,117	-0.4%	15.62	0.4%
212	10,862,037	0.4%	13,917,127	0.2%	87.3%	2,654	-0.7%	1,476,269	-0.3%	5,114	-0.4%	15.59	0.2%
213	10,811,266	-0.1%	13,888,319	-0.0%	87.2%	2,676	0.1%	1,482,428	0.1%	5,118	-0.4%	15.78	1.4%*
221	10,873,797	0.5%	13,916,070	0.2%	87.3%	2,664	-0.4%	1,479,419	-0.1%	5,102	-0.7%	15.67	0.7%
222	10,907,122	0.8%	13,937,073	0.3%	87.3%	2,654	-0.7%	1,478,390	-0.2%	5,095	-0.8%*	15.63	0.4%
223	10,851,139	0.3%	13,903,937	0.1%	87.2%	2,674	0.0%	1,483,235	0.2%	5,115	-0.4%	15.73	1.1%
231	11,154,471	3.1%*	14,047,551	1.1%*	87.9%	2,539	-5.0%*	1,458,703	-1.5%*	5,108	-0.5%	15.53	-0.2%
232	11,183,828	3.3%*	14,064,271	1.3%*	87.9%	2,535	-5.2%*	1,457,157	-1.6%*	5,094	-0.8%*	15.52	-0.3%
233	11,114,913	2.7%*	14,029,353	1.0%*	87.8%	2,549	-4.7%*	1,462,520	-1.2%	5,121	-0.3%	15.64	0.5%
313	10,763,370	-0.6%	13,838,166	-0.4%	87.0%	2,725	1.9%	1,494,232	0.9%	5,180	0.9%*	15.61	0.3%
323	10,803,330	-0.2%	13,853,778	-0.3%	87.0%	2,723	1.8%	1,495,039	1.0%	5,177	0.6%*	15.55	-0.1%
333	11,067,104	2.2%*	13,979,195	0.6%*	87.6%	2,598	-2.8%	1,474,323	-0.4%	5,183	0.9%*	15.47	-0.6%

Appendix C

Number of Buys By Dollar Value Category: By Service

Policy	$0-$50		$51-$100		$101-$500		$500-$1000		$1001-$2500		$2501-$5000		$5001-$10000		$10001-$15000		$15001-$20000		$20001-$25000		$25000+	
AIR FORCE																						
111	2,414		402		646		162		241		148		92		37		20		14		26	
112	2,433	0.8%	402	0.0%	654	1.2%	163	0.6%	243	0.8%	155	4.7%	92	0.0%	38	2.7%	20	0.0%	13	-7.1%	27	3.8%
113	2,345	-2.9% *	398	-1.0%	633	-2.0%	162	0.0%	240	-0.4%	146	-1.4%	92	0.0%	37	0.0%	20	0.0%	14	0.0%	26	0.0%
121	2,376	-1.6%	398	-1.0%	644	-0.3%	161	-0.6%	241	0.0%	148	0.0%	92	0.0%	37	0.0%	20	0.0%	14	0.0%	26	0.0%
122	2,382	-1.3%	396	-1.5%	650	0.6%	161	-0.6%	243	0.8%	153	3.4%	91	-1.1%	38	2.7%	20	0.0%	13	-7.1%	27	3.8%
123	2,345	-2.9% *	398	-1.0%	633	-2.0%	161	-0.6%	240	-0.4%	146	-1.4%	92	0.0%	37	0.0%	20	0.0%	14	0.0%	26	0.0%
131	2,367	-1.9% *	395	-1.7%	643	-0.5%	161	-0.6%	241	0.0%	153	3.4%	95	3.3%	38	2.7%	20	0.0%	14	0.0%	26	0.0%
132	2,362	-2.2% *	393	-2.2%	649	0.5%	164	1.2%	238	-1.2%	157	6.1%	93	1.1%	39	5.4%	20	0.0%	13	-7.1%	27	3.8%
133	2,345	-2.9% *	395	-1.7%	634	-1.9%	159	-1.9%	244	1.2%	150	1.4%	94	2.2%	38	2.7%	20	0.0%	14	0.0%	26	0.0%
211	2,388	-1.1%	405	0.7%	646	0.0%	158	-2.5%	244	1.2%	149	0.7%	94	2.2%	34	-8.1%	20	0.0%	14	0.0%	27	3.8%
212	2,407	-0.3%	405	0.7%	654	1.2%	159	-1.9%	246	2.1%	156	5.4%	94	2.2%	35	-5.4%	20	0.0%	13	-7.1%	28	7.7%
213	2,321	-3.9% *	401	-0.2%	633	-2.0%	158	-2.5%	243	0.8%	147	-0.7%	94	2.2%	34	-8.1%	20	0.0%	14	0.0%	27	3.8%
221	2,352	-2.6% *	401	-0.2%	644	-0.3%	157	-3.1%	244	1.2%	149	0.7%	94	2.2%	34	-8.1%	20	0.0%	14	0.0%	27	3.8%
222	2,358	-2.3% *	399	-0.7%	650	0.6%	157	-3.1%	246	2.1%	154	4.1%	93	1.1%	35	-5.4%	20	0.0%	13	-7.1%	28	7.7%
223	2,321	-3.9% *	401	-0.2%	633	-2.0%	157	-3.1%	243	0.8%	147	-0.7%	94	2.2%	34	-8.1%	20	0.0%	14	0.0%	27	3.8%
231	2,343	-2.9% *	398	-1.0%	643	-0.5%	157	-3.1%	244	1.2%	154	4.1%	97	5.4%	35	-5.4%	20	0.0%	14	0.0%	27	3.8%
232	2,338	-3.1% *	396	-1.5%	649	0.5%	160	-1.2%	241	0.0%	158	6.8%	95	3.3%	36	-2.7%	20	0.0%	13	-7.1%	28	7.7%
233	2,321	-3.9% *	398	-1.0%	634	-1.9%	155	-4.3%	247	2.5%	151	2.0%	96	4.3%	35	-5.4%	20	0.0%	14	0.0%	27	3.8%
313	2,360	-2.2% *	412	2.5%	641	-0.8%	156	-3.7%	236	-2.1%	142	-4.1%	91	-1.1%	36	-2.7%	20	0.0%	14	0.0%	26	0.0%
323	2,360	-2.2% *	412	2.5%	641	-0.8%	155	-4.3%	236	-2.1%	142	-4.1%	91	-1.1%	36	-2.7%	20	0.0%	14	0.0%	26	0.0%
333	2,360	-2.2% *	409	1.7%	642	-0.6%	153	-5.6%	240	-0.4%	146	-1.4%	93	1.1%	37	0.0%	20	0.0%	14	0.0%	26	0.0%

Appendix C (Cont.)

Number of Buys By Dollar Value Category: By Service

Period	$0-$50		$51-$100		$101-$500		$501-$1000		$1001-$2500		$2501-$5000		$5001-$10000		$10001-$15000		$15001-$20000		$20001-$25000		$25000+	
											ARMY											
111	2,146		352		584		150		202		121		91		24		15		13		32	
112	2,169	1.1%	345	-2.0%	592	1.4%	145	-3.3%	209	3.5%	120	-0.8%	93	2.2%	26	8.3%	20	5.3%	13	0.0%	32	0.0%
112	2,156	0.6%	346	-1.7%	587	0.5%	145	-3.3%	203	0.5%	121	0.0%	91	0.0%	23	-4.2%	19	0.0%	11	-15.4%	31	-3.1%
121	2,139	-0.8%	345	-2.0%	582	-0.3%	146	-2.7%	200	-1.0%	121	0.0%	92	1.1%	24	0.0%	15	0.0%	13	0.0%	32	0.0%
122	2,159	0.6%	342	-2.8%	588	0.7%	143	-4.7%	205	1.5%	121	0.0%	93	2.2%	26	8.3%	20	5.3%	13	0.0%	32	0.0%
122	2,145	-0.6%	343	-2.6%	583	-0.2%	147	-2.0%	203	0.5%	121	0.0%	92	1.1%	23	-4.2%	19	0.0%	11	-15.4%	31	-3.1%
122	2,131	-0.7%	345	-2.0%	578	-1.0%	146	-2.7%	205	1.5%	125	3.3%	94	3.3%	24	0.0%	17	-10.5%	15	15.4%	32	0.0%
122	2,138	-0.4%	342	-2.8%	583	-0.2%	143	-4.7%	207	2.5%	126	4.1%	93	2.2%	24	0.0%	19	0.0%	15	15.4%	32	0.0%
122	2,144	-0.1%	343	-2.6%	578	-1.0%	148	-1.3%	205	1.5%	124	2.5%	95	4.4%	26	8.3%	17	-10.5%	10	-23.1%	32	0.0%
123	2,193	2.2%	349	-0.9%	584	0.0%	147	-2.0%	201	-0.5%	122	0.8%	91	0.0%	24	0.0%	18	-5.3%	14	7.7%	32	0.0%
123	2,214	3.2%	343	-2.6%	590	1.0%	143	-4.7%	207	2.5%	121	0.0%	93	2.2%	26	8.3%	19	0.0%	14	7.7%	32	0.0%
123	2,205	2.7%	344	-2.3%	586	0.3%	143	-4.7%	202	0.0%	122	0.8%	91	0.0%	23	-4.2%	18	-5.3%	12	-7.7%	31	-3.1%
123	2,186	1.9%	343	-2.6%	582	-0.3%	143	-4.7%	199	-1.5%	122	0.8%	92	1.1%	24	0.0%	18	-5.3%	14	7.7%	32	0.0%
123	2,204	2.7%	340	-3.4%	586	0.3%	142	-5.3%	203	0.5%	122	0.8%	93	2.2%	26	8.3%	19	0.0%	14	7.7%	32	0.0%
123	2,192	2.1%	341	-3.1%	582	-0.3%	145	-3.3%	202	0.0%	122	0.8%	92	1.1%	23	-4.2%	18	-5.3%	12	-7.7%	31	-3.1%
123	2,178	1.5%	343	-2.6%	578	-1.0%	143	-4.7%	204	1.0%	126	4.1%	94	3.3%	24	0.0%	16	-15.8%	16	23.1%	32	0.0%
123	2,184	1.8%	340	-3.4%	581	-0.5%	142	-5.3%	205	1.5%	127	5.0%	93	2.2%	24	0.0%	18	-5.3%	16	23.1%	32	0.0%
123	2,191	2.1%	341	-3.1%	577	-1.2%	146	-2.7%	204	1.0%	125	3.3%	95	4.4%	26	8.3%	16	-15.8%	11	-15.4%	32	0.0%
123	2,178	1.5%	354	0.6%	595	1.9%	143	-4.7%	200	-1.0%	121	0.0%	86	-3.3%	25	4.2%	17	-10.5%	11	-15.4%	31	-3.1%
123	2,165	0.9%	351	-0.3%	593	1.5%	145	-3.3%	200	-1.0%	121	0.0%	89	-2.2%	25	4.2%	17	-10.5%	11	-15.4%	31	-3.1%
123	2,164	0.8%	351	-0.3%	588	0.7%	146	-2.7%	202	0.0%	124	2.5%	92	1.1%	28	16.7%	15	-21.1%	10	-23.1%	32	0.0%

Appendix C (Cont.)

Number of Buys By Dollar Value Category: By Service

Policy	$0-$50		$51-$100		$101-$500		$501-$1000		$1001-$1500		$1501-$5000		$5001-$10000		$10001-$15000		$15001-$20000		$20001-$25000		$25000+	
											NAV											
111	2,414		481		985		251		387		243		169		58		41		31		76	
112	2,411	-0.1%	477	-0.8%	982	-0.3%	252	0.4%	388	0.3%	246	1.2%	169	0.0%	60	3.4%	40	-2.4%	32	3.2%	76	0.0%
113	2,418	0.2%	470	-2.3%	992	0.7%	251	0.0%	391	1.0%	244	0.4%	166	-1.6%	58	0.0%	40	-2.4%	31	0.0%	76	0.0%
121	2,408	-0.2%	476	-1.0%	982	-0.3%	248	-1.2%	386	-0.3%	246	1.2%	171	1.2%	57	-1.7%	41	0.0%	31	0.0%	76	0.0%
122	2,405	-0.5%	472	-1.9%	978	-0.7%	251	0.0%	385	-0.5%	248	2.1%	170	0.6%	60	3.4%	40	-2.4%	32	3.2%	76	0.0%
123	2,417	0.1%	470	-2.7%	992	0.7%	248	-1.2%	390	0.8%	246	1.2%	168	-0.6%	57	-1.7%	40	-2.4%	31	0.0%	76	0.0%
131	2,403	-0.5%	475	-1.2%	976	-0.9%	247	-1.6%	393	1.6%	241	-0.8%	176	4.1%	66	13.8%	43	4.9%	31	0.0%	77	1.3%
132	2,399	-0.6%	470	-2.3%	972	-1.3%	247	-1.6%	386	-0.3%	244	0.4%	177	4.7%	68	17.2% *	43	4.9%	31	0.0%	77	1.3%
133	2,412	-0.1%	471	-2.1%	985	0.0%	247	-1.6%	356	2.7%	242	-0.4%	172	1.8%	67	15.5% *	43	4.9%	29	-6.5%	77	1.3%
211	2,392	-0.9%	482	0.2%	978	-0.7%	258	2.8%	387	0.0%	246	1.2%	168	-0.6%	58	0.0%	41	0.0%	32	3.2%	75	-1.3%
212	2,389	-1.0%	478	-0.6%	977	-0.8%	256	2.0%	389	0.5%	249	2.5%	168	-0.6%	60	3.4%	40	-2.4%	33	6.5%	75	-1.3%
213	2,396	-0.7%	471	-2.1%	985	0.0%	258	2.8%	391	1.0%	247	1.6%	165	-2.4%	58	0.0%	40	-2.4%	32	3.2%	75	-1.3%
221	2,386	-1.2%	477	-0.8%	974	-1.1%	255	1.6%	386	-0.3%	249	2.5%	170	0.6%	57	-1.7%	41	0.0%	32	3.2%	75	-1.3%
222	2,381	-1.4% *	473	-1.7%	972	-1.3%	255	1.6%	385	-0.5%	252	3.7%	169	0.0%	60	3.4%	40	-2.4%	33	6.5%	75	-1.3%
223	2,395	-0.8%	471	-2.1%	984	-0.1%	255	1.6%	390	0.8%	249	2.5%	167	-1.2%	57	-1.7%	40	-2.4%	32	3.2%	75	-1.3%
231	2,381	-1.4% *	476	-1.0%	968	-1.7%	254	1.2%	393	1.6%	244	0.4%	175	3.6%	66	13.8%	43	4.9%	32	3.2%	76	0.0%
232	2,377	-1.5% *	471	-2.1%	966	-1.9%	251	0.0%	386	-0.3%	248	2.1%	176	4.1%	68	17.2% *	43	4.9%	32	3.2%	76	0.0%
233	2,390	-1.0%	472	-1.9%	977	-0.8%	254	1.2%	396	2.3%	245	0.8%	171	1.2%	67	15.5% *	43	4.9%	30	-3.2%	76	0.0%
313	2,445	1.3% *	469	-2.5%	1,011	2.6% *	250	-0.4%	388	0.3%	247	1.6%	168	-0.6%	58	0.0%	39	-4.9%	31	0.0%	74	-2.6%
323	2,444	1.2% *	469	-2.5%	1,010	2.5% *	247	-1.6%	387	0.0%	249	2.5%	170	0.6%	57	-1.7%	39	-4.9%	31	0.0%	74	-2.6%
333	2,439	1.0%	470	-2.3%	1,003	1.8%	246	-2.0%	393	1.6%	245	0.8%	174	3.0%	67	15.5% *	42	2.4%	29	-6.5%	75	-1.3%

Appendix D

Reference

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